BUOYS

IN WATERS OF THE UNITED STATES

CG–194

UNITED STATES COAST GUARD

BUOYS IN WATERS OF THE UNITED STATES

INTRODUCTION

The maintenance of aids to marine navigation is a function of the United States Coast Guard. These navigational aids consist of lighthouses, lightships, radiobeacons, fog signals, buoys, minor lights, and day beacons. They mark all navigable waters of the United States and its possessions, including the Atlantic and Pacific coasts of continental United States, the Great Lakes, the Mississippi River and its tributaries, Puerto Rico, the Hawaiian Islands, Alaska, and the approaches to the Panama Canal.

The chief administrative officer is the Commandant of the Coast Guard, with headquarters located at Washington, D. C. Under his direction, the establishment, construction, maintenance, and operation of aids to navigation are carried on through administrative and engineering divisions in Washington, and various district offices. Because of the wide geographic distribution of aids to navigation on the sea coasts, the Great Lakes, and navigable rivers of the United States, with an aggregate coast line of over 40,000 miles, the field work of the Service is carried on by district organizations. There are 12 Coast Guard districts, carrying on lighthouse work, as well as other functions of the Coast Guard. Each district is under the supervision of a commander, assisted by suitable engineering and administrative forces, and is equipped with the necessary supply and buoy depots, and with suitable vessels for the maintenance of the navigational aids.

This pamphlet is a description of the system of buoyage maintained by the United States Coast Guard, detailing the purpose of buoys and the significance of their coloring, numbering, and shapes, as well as the meaning of their lights, bells, and whistles. It has been prepared primarily for instruction work and is not intended to replace the Light Lists, Coast Pilots, and Charts dealing with the subject.

All vessels, no matter of what size, should be equipped with the latest editions of the Light Lists, published by the United States Coast Guard. These lists, which are revised annually, contain full information regarding all lighted and unlighted aids to navigation, including lighthouses, lightships, radiobeacons, fog signals, buoys, and beacons.

THE SIGNIFICANCE OF BUOYS

The primary function of buoys is to warn the mariner of some danger, some obstruction, or change in the contours of the sea bottom, and to delineate the channels leading to various points, that he may avoid the dangers and continue his course safely. The utmost advantage is obtained from buoys when they are considered as marking

definitely identified spots, for if a mariner knows his precise location at the moment and is properly equipped with charts, he can readily plot a safe course on which to proceed. Such features as size, shape, coloring, numbering, and signalling equipment of buoys, are but means to these ends of warning, guiding, and orienting.

THE LATERAL SYSTEM

The coloring and numbering of buoys is determined by their position with respect to the navigable channels, as such channels are entered and followed from seaward toward the head of navigation. This method of channel marking, known as the lateral system, is uniform in all United States waters and is described in detail herein under the headings, Coloring, and Numbering. As all channels do not lead from seaward, arbitrary assumptions must at times be made in order that the system may be consistently applied. In coloring and numbering of offshore buoys along the coasts and along traffic routes not leading distinctly from seaward or toward headwaters, the following system has been adopted: Proceeding in a southerly direction along the Atlantic coast, in a northerly and westerly direction along the Gulf Coast and in a northerly direction along the Pacific coast, will be considered as proceeding from seaward, and accordingly, coastal buoys which are to be kept on the right hand side are red and have even numbers. On the Great Lakes offshore buoys are colored and numbered from the outlet of each lake toward its upper end. The Intracoastal Waterway is marked from the north Atlantic States to the lower coast of Texas, regardless of the compass headings of individual sections.

TYPES OF BUOYS

The buoyage system adopted for waters of the United States consists of several different types of buoys, each kind designed to serve under definite conditions. Broadly speaking, all buoys serve as daymarks during the daytime, those having lights are also available for navigation by night, and those having sound signals are more readily located in time of fog as well as by night. The following are the principal general types.

SPAR BUOYS

Spar buoys are usually large logs, trimmed, shaped, appropriately painted, and moored with a suitable length of chain and a sinker. They vary in length from 20 to 50 feet, depending upon the depth of water in which they are moored. Spar-shaped buoys are also constructed of steel plates.

CAN AND NUN BUOYS

Can and nun buoys are built up of steel plates, in various sizes. They are moored with a chain to which is affixed a sinker of appropriate weight.

BELL BUOYS

Bell buoys serve with considerable effectiveness both day and night, and also during fog, and are much used because of their moderate

maintenance cost. Most bell buoys are sounded by motion of the buoy in the sea, four clappers being loosely hung so that they are readily set in motion. In a few buoys, the bells are sounded by mechanism operated by compressed gas or electric batteries, their strokes sounding at regular intervals, and are particularly useful in sheltered waters.

GONG BUOYS

Gong buoys are used to provide a distinctive sound when there are several bell buoys in one vicinity. These buoys differ from bell buoys in that gongs of different tones, each with a separate clapper, take the place of the bell. As the sea rocks the buoy, the clappers strike against the gongs, sounding three or four different notes. There is, of course, no particular sequence to the notes, but the effect is quite distinctive.

WHISTLE BUOYS

Whistle buoys provide a sound signal which is useful at night and also during fog or low visibility. Such buoys also serve as daymarks. They are used principally in open and exposed places where a ground swell normally exists, as the whistle is sounded by compressed air produced by the motion of the buoy in the sea. Whistle buoys have a conical shaped top, above which the whistle projects, protected by cage work. These buoys have no shape significance and the same type may be found in mid-channel or on either side of a channel. In combination buoys, having lights as well as whistles, the whistle is located within the latticework tower, immediately below the light. A type of sound buoy is now being introduced in which a horn is sounded at regular intervals by mechanical means.

LIGHTED BUOYS

The type of lighted buoys in general use today burns compressed acetylene gas, contained in steel tanks inside the buoys. From the tanks the gas is conveyed by tube to a flasher set in the lantern at the top of the buoy. A valve mechanism operated by the gas pressure permits a definite amount of gas to pass to the burner at intervals, there to be ignited by a pilot flame which burns continuously. The frequency and length of the flash may be adjusted to produce a definite characteristic. Buoys lighted electrically are also being used, the number increasing each year.

COMBINATION BUOYS

These are lighted buoys which are also fitted with some form of sound signal such as a bell, a gong, a whistle, or a horn.

COLORING OF BUOYS

All buoys are painted distinctive colors to indicate their purpose or the side of the channel which they mark.

Red buoys mark the right hand sides of channels, entering from seaward.

Black buoys mark the left hand sides of channels, entering from seaward.

Red and black horizontally banded buoys mark obstructions, or a junction of one channel with another, and indicate that there is a channel on either side. If the topmost band is red, the principal channel will be followed by keeping the buoy on the right hand side of the vessel, when entering from seaward. If the topmost band is black, the principal channel will be followed by keeping the buoy on the left hand side of the vessel, when entering from seaward.

(NOTE.—When proceeding toward the sea, it may not be possible to pass on either side of these buoys, and the chart should always be consulted.)

Black and white vertically striped buoys indicate the middle of a channel, and should be passed close to, but on either side, for safety.

White buoys mark anchorages.

Yellow buoys mark quarantine achorages.

White buoys with green tops mark areas in which dredging is being carried on.

Black and white horizontally banded buoys mark the limits of areas in which fish nets and traps are permitted.

Red or black (unlighted) buoys with white tops have the same significance as similar buoys without the white top, the white painting being added so that the buoys may be readily picked up at night by a ship's searchlight.

NUMBERING OF BUOYS

Most buoys are given numbers, which are painted conspicuously upon them. These numbers serve to indicate which side of the channel the buoys mark, and also facilitate the locating of the buoys upon the charts.

Numbers increase from seaward and are kept in approximate sequence on the two sides of the channel by omitting numbers as required.

Odd numbered buoys mark the left-hand sides of channels entering from seaward.

Even numbered buoys mark the right-hand sides of channels entering from seaward.

Numbers followed by letters, such as 1 DR, are used on important buoys, particularly those marking isolated offshore dangers. The letters are initials of the station name, in this instance Duxbury Reef, and the number has the usual significance.

Letters without numbers, are applied in some cases to black and white vertically striped buoys marking fairways, and to red and black horizontally banded buoys marking junctions or bifurcations.

SHAPES OF BUOYS

In a large portion of the unlighted buoys used in United States waters, the shape of the buoy has a definite significance, indicating which side of the channels they mark. Cylindrical buoys with flat tops are known as can buoys, and if painted black, mark the left-hand sides of channels entering from seaward. Conical buoys with pointed

tops are known as nun buoys, and if painted red, mark the right-hand sides of channels entering from seaward.

Cylindrical or can buoys, painted in red and black horizontal bands, with the topmost band black, are used to indicate an obstruction or a junction of one channel with another, where the principal channel entering from seaward lies to the right of the buoy. Conical or nun buoys, painted in red and black horizontal bands, with the topmost band red, are used to indicate an obstruction or junction where the principal channel entering from seaward lies to the left of the buoy.

Can or nun buoys with black and white vertical stripes indicate the middle of a channel, and may be passed safely on either side. In these the shape has no significance.

No special significance is to be attached to the shapes of spar buoys, bell buoys, gong buoys, lighted buoys, whistle buoys, or combination buoys, their purpose being indicated only by their coloring, numbering, or the characteristic of the light.

SIZES OF BUOYS

The various types of buoys are made in different sizes to fit them for service in waters of different depths and varying degrees of exposure. These sizes in no way affect the significance of the buoys and need not be taken into consideration by mariners except as a means of judging distance.

COLOR OF LIGHTS

For all buoys having lights, the following system of coloring is used. Green lights are used only on buoys marking the left-hand sides of channels entering from seaward. Red lights are used only on buoys marking the right hand sides of channels entering from seaward. White lights may be used on either side of the channel, and such lights are frequently employed in place of colored lights at points where a light of considerable brilliance is required, particularly as leading or turning lights.

REFLECTORS

Reflectors are placed upon many unlighted buoys, and greatly facilitate the locating of the buoys at night by means of a searchlight. Reflectors may be white, red, or green, and have the same significance as lights of these colors.

LIGHT CHARACTERISTICS

Fixed lights (lights that do not flash) may be found on either black or red buoys.

Flashing lights (flashing at regular intervals and at the rate of not more than 30 flashes per minute) are placed on either black buoys or on red buoys.

Quick flashing lights (not less than 60 flashes per minute) are placed on black buoys and on red buoys at points where it is desired to indicate that special caution is required, as at sharp turns or sudden constrictions or where used to mark obstructions which may be passed only on one side.

Interrupted quick-flashing lights (the groups consisting of a series of quick flashes, with dark intervals of about four seconds between groups) are placed on buoys painted in red and black horizontal bands, indicating obstructions or a junction of one channel with another.

Short-long flashing lights (groups consisting of a short flash and a long flash, the flashes recurring at the rate of about eight per minute) are placed on buoys painted in black and white vertical stripes, indicating a fairway or the middle of a channel. These buoys should be passed close to. The lights are always white.

FISH NET BUOYS

Particularly, though not exclusively, in the Chesapeake Bay area, special buoys are used to mark the limits of areas in which fish nets and traps are permitted, such areas and the buoys, being shown also upon the charts. These buoys are chiefly spars, and are painted in black and white horizontal bands.

INTRACOASTAL WATERWAYS AIDS

The aids to navigation marking the Intracoastal Waterway have a characteristic yellow marking in addition to their usual coloring to indicate which side of the channel they mark. Buoys have a yellow band at the top. Single pile day beacons have a yellow band at the top. Daymarks on light structures have a yellow border.

In addition to the special Intracoastal Waterway coloring, all aids in this waterway are painted in the usual manner to indicate which side of the channel they mark. All aids in this waterway are colored and numbered from the north Atlantic States to the lower coast of Texas regardless of the compass headings of individual sections.

Where the Intracoastal Waterway follows another waterway, wherein the aids are colored and numbered in the opposite direction, a yellow triangle is placed on black buoys, and a yellow square on red buoys. This indicates that buoys with the triangular markings are to be considered as nun buoys, and the square marked buoys as can buoys, insofar as a vessel following the Intracoastal Waterway is concerned.

NOTICE TO MARINERS

When vessels are in active operation, the owners or operators should keep themselves fully informed of the proposed changes in the navigational aids in the vicinity in which they intend to cruise. Information regarding changes in aids is made available through the weekly Notice to Mariners, prepared jointly by the Coast Guard and the Hydrographic Office of the Navy. Notices to Mariners are mailed, on application to the Coast Guard, without charge to individuals who have definite use for them, and to yacht clubs and similar organizations having facilities for making their contents available, by posting or otherwise. In addition to these printed notices issued from Washington, each district commander issues from time to time Local Notices to Mariners with respect to aids to navigation in his district. These local notices also cover emergency matters as well as temporary misplacements and outages. They are similarly made available to organ-

izations such as those noted and to newspapers for publication. Radio broadcasts are also made by each district concerning temporary deficiencies and important changes in aids to navigation.

LIGHT LISTS AND CHARTS

All vessels, when in active service, regardless of their size, should be equipped with the appropriate Light Lists and Charts for the waters in which they will be operated. The Light Lists, published by the United States Coast Guard, are issued in five volumes, as follows: Atlantic and Gulf, Intracoastal Waterway, Great Lakes, Pacific, and Mississippi River. They may be purchased separately. Charts of United States waters are published by the Coast and Geodetic Survey, of the Department of Commerce.

BRIEF HISTORY OF BUOYAGE

Buoyage of navigable waterways in this country was undertaken at least as early as 1767, when, according to available records, buoys were in use in the Delaware River. The earliest types were simply solid wooden spars or were built up of staves, similar to a barrel. This stave construction was employed in small buoys used near Boston about 1808, but these gave way to spar buoys about 1820, supplemented by iron buoys in 1850. A marked improvement was effected in 1900 when tall can and nun buoys were introduced. In 1881, the first lighted buoy, burning oil gas, was put into service outside New York Harbor. Electricity was employed from 1888 to 1903 in the Gedney Channel in New York lower bay. Current for these buoys was supplied through cables from shore, but this system proved impractical. Buoys lighted by compressed acetylene gas stored in tanks within the buoy itself, the type of lighted buoy in general use today, were introduced in 1910. Bell buoys, in which the bell is struck by clappers actuated by the rolling of the buoy in the sea, have been in service since 1885; and now buoys are also in service in which the bell is struck at regular intervals by a mechanism operated by compressed gas. Whistle buoys, the whistle sounded through motion of the buoy in the sea, have been employed since 1876. Similar buoys are now available in which a horn is sounded by electrical means. Tests have also been made of buoys fitted with automatic radiobeacons, and the use of these is being extended.

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UNITED STATES COAST GUARD

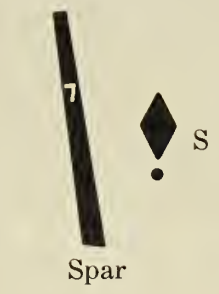
BUOYAGE OF THE UNITED STATES

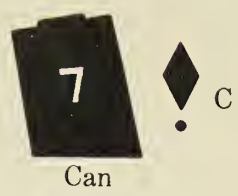
SIGNIFICANCE OF SHAPES, COLORING, NUMBERING, AND LIGHT CHARACTERISTICS.

SYMBOLS SHOWN ADJACENT TO BUOYS ARE THOSE USED ON CHARTS TO INDICATE SUCH AIDS.

PORT SIDE Entering from Seaward (Read up)	MID-CHANNEL AND JUNCTIONS OR OBSTRUCTIONS Entering from Seaward (Read up)	STARBOARD SIDE Entering from Seaward (Read up)
Color: BLACK Numbers: ODD	Color: AS SHOWN Numbers: NONE	Color: RED Numbers: EVEN

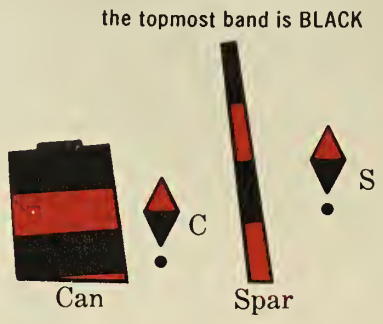
UNLIGHTED SPAR, NUN AND CAN BUOYS





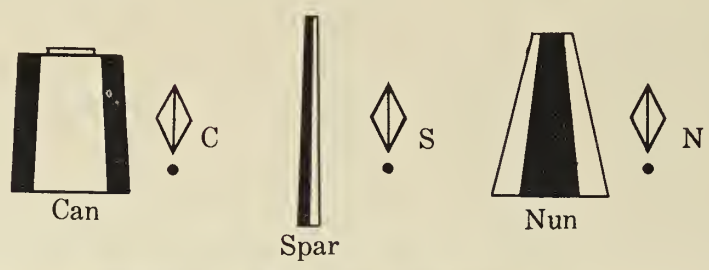
For JUNCTIONS or OBSTRUCTIONS Red and Black Horizontal Bands

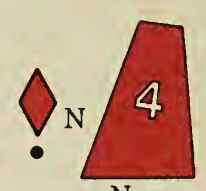
Where preferred channel is to STARBOARD the topmost band is BLACK



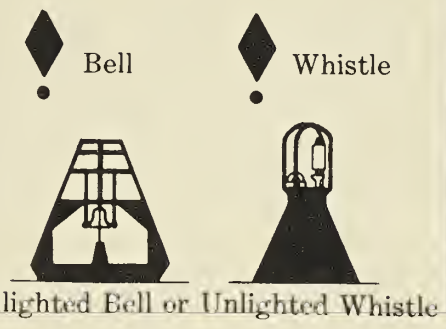
Where preferred channel is to PORT the topmost band is RED

For MID-CHANNEL or FAIRWAY Black and White Vertical Stripes



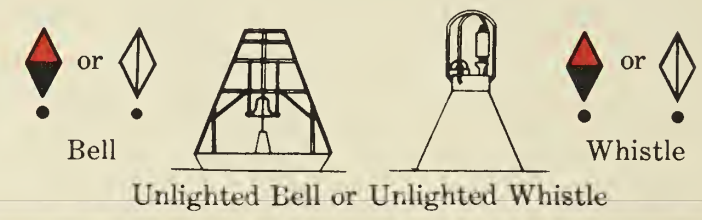


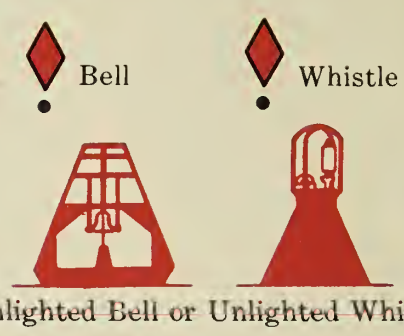
TYPICAL SOUND BUOYS



No Special Shapes. Buoy Colors Same as for Unlighted Buoys, as Shown above.

JUNCTIONS, MIDDLE GROUNDS and OBSTRUCTIONS





LIGHT CHARACTERISTICS AND TYPICAL LIGHTED BUOYS

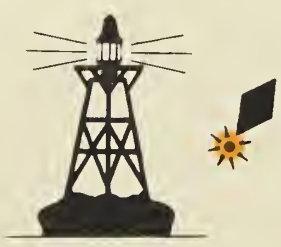
COLOR OF LIGHTS GREEN or WHITE

SLOW FLASHING
(at regular intervals)

OCCULTING
(at regular intervals)

QUICK FLASHING

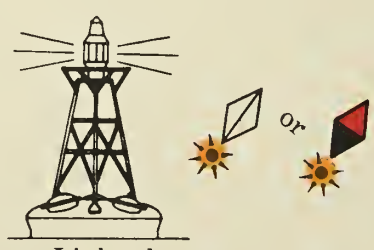
Marking important turns, etc., where particular caution is required.



For JUNCTIONS or OBSTRUCTIONS
INTERRUPTED QUICK FLASHING
COLOR OF LIGHT WHITE, RED or GREEN

For MID-CHANNEL or FAIRWAY
SHORT-LONG FLASHING
COLOR OF LIGHT WHITE only

No Special Shapes. Buoy Colors Same as for Unlighted Buoys, as Shown above.



COLOR OF LIGHTS RED or WHITE

SLOW FLASHING
(at regular intervals)

OCCULTING
(at regular intervals)

QUICK FLASHING

Marking important turns, etc., where particular caution is required.

BUOYS MARKING SPECIAL AREAS

No special shapes or numbers

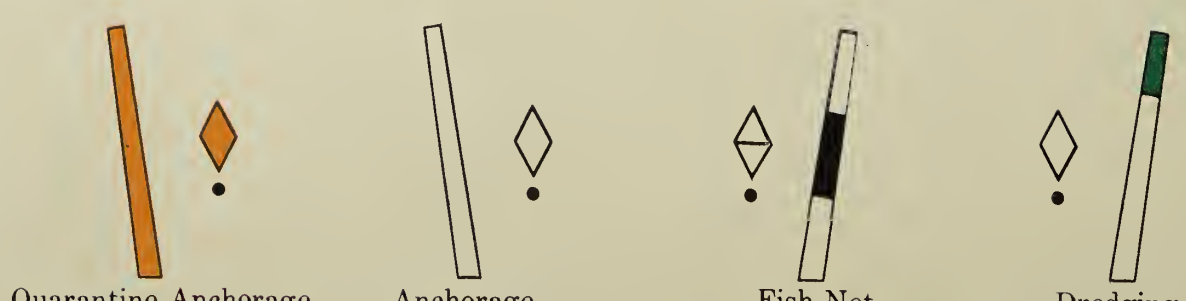


FIGURE 4–5. *Present buoyage of the United States (1945).*

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